

**CIHM  
Microfiche  
Series  
(Monographs)**

**ICMH  
Collection de  
microfiches  
(monographies)**



**Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques**

**© 1999**

## Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming are checked below.

L'institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- |  |   |
|--|---|
| <p><input type="checkbox"/> Coloured covers /<br/>Couverture de couleur</p> <p><input type="checkbox"/> Covers damaged /<br/>Couverture endommagée</p> <p><input type="checkbox"/> Covers restored and/or laminated /<br/>Couverture restaurée et/ou pelliculée</p> <p><input type="checkbox"/> Cover title missing / Le titre de couverture manque</p> <p><input type="checkbox"/> Coloured maps / Cartes géographiques en couleur</p> <p><input type="checkbox"/> Coloured ink (i.e. other than blue or black) /<br/>Encre de couleur (i.e. autre que bleue ou noire)</p> <p><input type="checkbox"/> Coloured plates and/or illustrations /<br/>Planches et/ou illustrations en couleur</p> <p><input type="checkbox"/> Bound with other material /<br/>Relié avec d'autres documents</p> <p><input type="checkbox"/> Only edition available /<br/>Seule édition disponible</p> <p><input type="checkbox"/> Tight binding may cause shadows or distortion along<br/>interior margin / La reliure serrée peut causer de<br/>l'ombre ou de la distorsion le long de la marge<br/>intérieure.</p> <p><input type="checkbox"/> Blank leaves added during restorations may appear<br/>within the text. Whenever possible, these have been<br/>omitted from filming / Il se peut que certaines pages<br/>blanches ajoutées lors d'une restauration<br/>apparaissent dans le texte, mais, lorsque cela était<br/>possible, ces pages n'ont pas été filmées.</p> <p><input checked="" type="checkbox"/> Additional comments /<br/>Commentaires supplémentaires:</p> | <p><input type="checkbox"/> Coloured pages / Pages de couleur</p> <p><input type="checkbox"/> Pages damaged / Pages endommagées</p> <p><input type="checkbox"/> Pages restored and/or laminated /<br/>Pages restaurées et/ou pelliculées</p> <p><input checked="" type="checkbox"/> Pages discoloured, stained or foxed /<br/>Pages décolorées, tachetées ou piquées</p> <p><input type="checkbox"/> Pages detached / Pages détachées</p> <p><input checked="" type="checkbox"/> Showthrough / Transparence</p> <p><input type="checkbox"/> Quality of print varies /<br/>Qualité inégale de l'impression</p> <p><input type="checkbox"/> Includes supplementary material /<br/>Comprend du matériel supplémentaire</p> <p><input type="checkbox"/> Pages wholly or partially obscured by errata slips,<br/>tissues, etc., have been refilmed to ensure the best<br/>possible image / Les pages totalement ou<br/>partiellement obscurcies par un feuillet d'errata, une<br/>pelure, etc., ont été filmées à nouveau de façon à<br/>obtenir la meilleure image possible.</p> <p><input type="checkbox"/> Opposing pages with varying colouration or<br/>discolourations are filmed twice to ensure the best<br/>possible image / Les pages s'opposant ayant des<br/>colorations variables ou des décolorations sont<br/>filmées deux fois afin d'obtenir la meilleure image<br/>possible.</p> |
|--|---|
- Continuous pagination.**

This item is filmed at the reduction ratio checked below /  
Ce document est filmé au taux de réduction indiqué ci-dessous.

|                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 10x                      |                          | 14x                      |                          | 18x                      |                          | 22x                      |                          | 26x                      |                          | 30x                      |                          |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                          | 12x                      |                          | 16x                      |                          | 20x                      |                          | 24x                      |                          | 28x                      |                          | 32x                      |

The copy filmed here has been reproduced thanks to the generosity of:

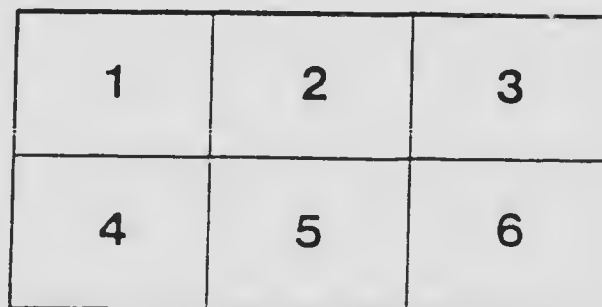
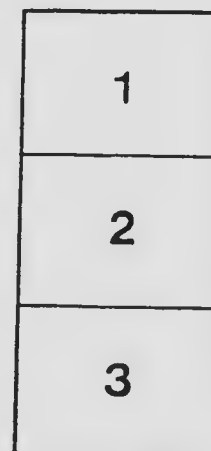
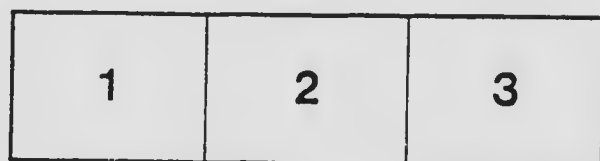
École polytechnique,  
Université de Montréal,  
Bibliothèque

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol  $\rightarrow$  (meaning "CONTINUED"), or the symbol  $\nabla$  (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

École polytechnique,  
Université de Montréal,  
Bibliothèque

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole  $\rightarrow$  signifie "A SUIVRE", le symbole  $\nabla$  signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

MICROCOPY RESOLUTION TEST CHART

ANSI and ISO TEST CHART No. 2



APPLIED IMAGE, Inc

2555 NORTH 10TH AVENUE  
ANN ARBOR, MICHIGAN 48106  
TEL: (313) 963-1000  
FAX: (313) 963-1001

BIRCHBECK & CO.  
 LIMITED, THE UNIVERSITY  
 OF TORONTO

PUBLICATIONS  
 OF THE  
**DOMINION OBSERVATORY**  
 OTTAWA, CANADA  
 Vol. IV, No. 6

ORBIT OF THE SPECTROSCOPIC BINARY 40 AURIGAE

BY REYNOLD K. YOUNG, Ph.D

Forty Aurigae ( $\alpha = 5^h 59^m.6$ ,  $\delta = +38^\circ 29'$ , mag. 5.31, type A) was announced as a spectroscopic binary by Lee in the *Astrophysical Journal*, Vol. XXXIX, 1914. The following discussion of the orbit is based on measures of the three plates given there, and fifty-three taken here with a one-prism spectrograph attached to the 15-inch telescope.

TABLE I

| $\lambda$ | $\lambda$ | $\lambda$ | $\lambda$ |
|-----------|-----------|-----------|-----------|
| 1005.102  | 1292.118  | 1294.270  | 1181.402  |
| 1039.766  | 1215.744  | 1307.979  | 1501.503  |
| 1033.092  | 1233.421  | 1325.907  | 1508.455  |
| 1045.974  | 1236.601  | 1340.669  | 1520.430  |
| 1063.706  | 1259.698  | 1351.990  | 1522.909  |
| 1071.862  | 1260.579  | 1395.287  | 1534.140  |
| 1101.891  | 1271.643  | 1401.928  | 1540.717  |
| 1113.789  | 1282.585  | 1415.213  | 1558.990  |
| 1191.672  | 1290.149  | 1468.870  | 1572.143  |
| 1198.719  | 1077.885  |           |           |

D

Table I gives the wave-lengths of the lines used in reducing the measures. They are the same as those found for the binary Groombridge 1149 and seem to suit the present spectrum very well. The journal of observations follows in Table II. The residuals given in this table under O-C were determined graphically from the final curve. The weights are those used in the least-square solution.

CA1  
 MT 403  
 PO4-06

TABLE II

| Plate  | Observer* | Date          | Julian Day    | Phase from 2,420,462 | Primary  |        |     | Secondary |        |     |
|--------|-----------|---------------|---------------|----------------------|----------|--------|-----|-----------|--------|-----|
|        |           |               |               |                      | Velocity | Weight | O-C | Velocity  | Weight | O-C |
| Yerkes |           | 1913, Oct. 2  | 2,120,913.924 | 6.424                | -58.5    |        | + 4 | +130.8    |        | +16 |
| "      |           | " 3           | 11.892        | 7.092                | -35.6    |        | +13 | + 92.0    |        | + 3 |
| "      |           | " 6           | 17.897        | 10.097               | +22.8    |        |     |           |        |     |
| 6601   | Y         | 1914, Dec. 5  | 2,420,472.855 | 10.855               | +19.1    |        |     |           |        |     |
| 6606   | H         | " 6           | 473.753       | 11.753               | +17.9    |        |     |           |        |     |
| 6610   | Y         | " 10          | 477.908       | 15.908               | +21.0    |        |     |           |        |     |
| 6629   | Y-H       | " 15          | 482.727       | 20.727               | +21.0    |        |     |           |        |     |
| 6645   | Y         | " 17          | 484.823       | 22.823               | +20.2    |        |     |           |        |     |
| 6657   | C         | " 23          | 490.632       | 0.352                | +21.1    |        |     |           |        |     |
| 6661   | Y         | " 25          | 492.663       | 2.383                | +18.0    |        |     |           |        |     |
| 6668   | Y         | " 30          | 497.622       | 7.352                | -12.2    | 1      | 0   | + 91.4    | 1      | + 3 |
| 6673   | Y         | " 31          | 498.719       | 8.439                | + 5.4    |        |     |           |        |     |
| 6704   | Y         | 1915, Jan. 10 | 508.688       | 18.408               | +20.1    |        |     |           |        |     |
| 6727   | Y         | " 23          | 521.802       | 3.242                | +12.1    |        |     |           |        |     |
| 6732   | Y         | " 24          | 522.661       | 4.101                | - 9.5    | 1      | + 5 | + 72.3    | 1      | +15 |
| 6745   | P         | " 27          | 525.755       | 7.195                | -18.1    | 1      | - 2 | + 92.4    | 1      | - 1 |
| 6751   | Y         | " 28          | 526.775       | 8.215                | + 3.2    |        |     |           |        |     |
| 6762   | P         | " 30          | 528.678       | 10.118               | +15.2    |        |     |           |        |     |
| 6768   | C-P       | Feb. 3        | 532.710       | 14.150               | +25.2    |        |     |           |        |     |
| 6806   | C         | " 19          | 548.567       | 1.727                | +18.0    |        |     |           |        |     |
| 6814   | P         | " 20          | 549.711       | 2.871                | +12.8    |        |     |           |        |     |
| 6814   | Y         | " 21          | 550.597       | 3.757                | + 0.4    |        |     |           |        |     |
| 6884   | H         | Mar. 22       | 579.618       | 4.498                | -21.8    | 1      | 0   | + 75.4    | 1      | + 7 |
| 6887   | Y         | " 23          | 580.563       | 5.443                | -51.2    | 1      | + 1 | + 91.4    | 1      | - 9 |
| 6938   | Y         | April 20      | 608.549       | 5.149                | -12.5    | 1      | + 2 | + 89.4    | 1      | 0   |
| 6946   | C         | " 21          | 609.594       | 6.194                | -67.8    | 1      | - 5 | +108.0    | 1      | - 6 |
| 7226   | Y         | Sept. 9       | 750.861       | 5.064                | -66.4    | 1      | - 3 | +109.7    | 1      | - 4 |
| 7324   | Y         | Oct. 9        | 780.872       | 7.792                | -26.3    | 1      | + 4 | + 80.2    | 1      | + 6 |
| 7330   | H         | " 10          | 781.731       | 8.651                | + 6.7    |        |     |           |        |     |
| 7336   | C         | " 11          | 782.832       | 9.752                | +13.6    |        |     |           |        |     |
| 7374   | Y-C       | Nov. 3        | 805.717       | 4.387                | -23.7    | 1      | - 4 | + 59.9    | 1      | - 4 |
| 7383   | Y         | " 6           | 808.804       | 7.474                | -43.4    | 1      | - 3 | + 85.1    | 1      | - 1 |
| 7438   | Y         | Dec. 2        | 834.949       | 5.279                | -48.6    | 1      | - 1 | + 93.6    | 1      | - 1 |
| 7439   | Y         | " 2           | 834.957       | 5.317                | -54.7    | 1      | - 6 | +100.2    | 1      | + 4 |
| 7441   | Y         | " 3           | 835.625       | 5.985                | -64.6    | 1      | - 3 | +116.2    | 1      | + 2 |
| 7444   | C         | " 3           | 835.811       | 6.171                | -67.2    | 1      | - 4 | +108.6    | 1      | - 5 |
| 7466   | H         | " 30          | 862.637       | 1.717                | -33.2    | 1      | - 2 | + 71.1    | 1      | - 4 |
| 7467   | H-Y       | " 30          | 862.695       | 1.775                | -27.2    | 1      | + 5 | + 72.5    | 1      | - 4 |
| 7497   | C         | 1916, Jan. 28 | 891.729       | 5.529                | -49.3    | 1      | + 5 | + 99.2    | 1      | - 4 |
| 7498   | C         | " 28          | 891.776       | 5.576                | -54.2    | 1      | + 1 | + 95.7    | 1      | - 8 |
| 7524   | C         | Feb. 28       | 922.566       | 8.086                | -20.8    | 1/2    | + 2 | + 77.0    | 1/2    | +11 |
| 7525   | C         | " 28          | 922.622       | 8.142                | -23.2    | 1/2    | + 1 | + 61.4    | 1/2    | - 3 |
| 7526   | C         | " 28          | 922.678       | 8.198                | -23.3    | 1/2    | + 1 | + 63.7    | 1/2    | - 4 |
| 7576   | Y-P       | Mar. 25       | 948.520       | 5.760                | -56.0    | 1      | + 3 | +115.2    | 1/2    | + 6 |
| 7787   | Y         | Aug. 15       | 2,421,091.853 | 7.693                | -31.5    | 1      | 0   | + 70.3    | 1/2    | - 7 |
| 7810   | Y         | Sept. 11      | 118.849       | 6.409                | -55.6    | 1      | + 6 | +115.4    | 1/2    | + 4 |
| 7811   | Y         | " 11          | 118.896       | 6.456                | -57.6    | 1      | + 4 | +117.0    | 1/2    | + 6 |
| 7873   | Y         | Oct. 11       | 148.741       | 8.021                | -25.4    | 1      | - 1 | + 58.6    | 1/2    | -10 |
| 7924   | Y         | Dec. 5        | 203.670       | 6.390                | -63.8    | 1      | - 1 | +124.2    | 1/2    | +10 |
| 8074   | Y         | 1917, Feb. 27 | 287.553       | 5.453                | -50.9    | 1      | + 2 | + 94.0    | 1/2    | -10 |
| 8081   | Y         | Mar. 1        | 288.497       | 7.397                | -42.0    | 1      | - 1 | + 84.8    | 1/2    | - 3 |
| 8083   | Y         | " 1           | 288.615       | 7.515                | -45.7    | 1      | - 5 | + 87.2    | 1/2    | + 4 |
| 8084   | Y         | " 1           | 288.679       | 7.579                | -39.3    | 1      | - 1 | + 82.6    | 1/2    | + 2 |

\* P. Plaskett; H. Harper; C. Cannon; P. Parker; Y. Young

ORBIT OF THE SPECTROSCOPIC BINARY  $\theta$  AURIGÆ

MEASURES OF  $\theta$  AURIGÆ

| A               | 6601   |               | 6606   |               | 6610   |               | 6629   |               | 6615   |               | 6657   |               | 6661   |               |
|-----------------|--------|---------------|--------|---------------|--------|---------------|--------|---------------|--------|---------------|--------|---------------|--------|---------------|
|                 | Vel.   | Wt.           | Vel.   | Wt.           | Vel.   | Wt.           | Vel.   | Wt.           | Vel.   | Wt.           | Vel.   | Wt.           | Vel.   | Wt.           |
| 4005            |        |               | +17.9  | $\frac{1}{2}$ | +18.9  | $\frac{1}{2}$ | +25.6  | $\frac{1}{2}$ | +20.4  | $\frac{1}{2}$ | +20.4  | $\frac{1}{2}$ | +25.8  | $\frac{1}{2}$ |
| 4021            |        |               |        |               |        |               |        |               |        |               | +21.6  | $\frac{1}{2}$ |        |               |
| 4030            | +14.9  | $\frac{1}{2}$ |        |               | +20.5  | $\frac{1}{2}$ |        |               |        |               | +20.1  | $\frac{1}{2}$ |        |               |
| 4045            | +5.3   | $\frac{1}{2}$ | +5.3   | $\frac{1}{2}$ | +15.4  | $\frac{1}{2}$ | +22.2  | $\frac{1}{2}$ | +11.5  | $\frac{1}{2}$ | +19.5  | $\frac{1}{2}$ | +16.0  | $\frac{1}{2}$ |
| 4063            | +11.5  | $\frac{1}{2}$ | +18.1  | $\frac{1}{2}$ |        |               | +8.2   | $\frac{1}{2}$ | +11.8  | $\frac{1}{2}$ | +21.7  | 1             | +19.9  | $\frac{1}{2}$ |
| 4071            |        |               |        |               | +10.2  | $\frac{1}{2}$ |        |               |        |               |        |               | +15.5  | $\frac{1}{2}$ |
| 1077            | +3.8   | $\frac{1}{2}$ | +11.9  | $\frac{1}{2}$ | +13.7  | $\frac{1}{2}$ |        |               | +15.5  | $\frac{1}{2}$ | +22.8  | $\frac{1}{2}$ |        |               |
| 4143            | +8.1   | 1             | +11.0  | $\frac{1}{2}$ |        |               |        |               |        |               | +16.7  | $\frac{1}{2}$ |        |               |
| 4202            |        |               |        |               |        |               |        |               |        |               | +27.4  | $\frac{1}{2}$ | +23.3  | $\frac{1}{2}$ |
| 4215            | +11.2  | $\frac{1}{2}$ | +11.3  | $\frac{1}{2}$ |        |               | +12.2  | $\frac{1}{2}$ | +32.7  | $\frac{1}{2}$ | +16.3  | 1             | +26.7  | $\frac{1}{2}$ |
| 4233            | +12.1  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               | +19.4  | $\frac{1}{2}$ | +19.9  | $\frac{1}{2}$ |
| 4250            |        |               |        |               | +16.3  | $\frac{1}{2}$ |        |               |        |               | +16.3  | $\frac{1}{2}$ | +1.8   | $\frac{1}{2}$ |
| 4260            | +11.6  | $\frac{1}{2}$ | +3.1   | $\frac{1}{2}$ |        |               |        |               |        |               | +30.3  | $\frac{1}{2}$ | +21.2  | $\frac{1}{2}$ |
| 4271            | +13.5  | $\frac{1}{2}$ | +3.8   | $\frac{1}{2}$ |        |               | +23.1  | $\frac{1}{2}$ | +23.1  | $\frac{1}{2}$ |        |               | +16.1  | $\frac{1}{2}$ |
| 4282            |        |               |        |               |        |               |        |               |        |               |        |               | +25.8  | $\frac{1}{2}$ |
| 4289            | +7.6   | $\frac{1}{2}$ | -0.2   | $\frac{1}{2}$ | +14.2  | 1             | +4.1   | $\frac{1}{2}$ | +14.2  | $\frac{1}{2}$ | +27.9  | 1             | +22.8  | $\frac{1}{2}$ |
| 4291            |        |               |        |               |        |               |        |               |        |               | +25.1  | $\frac{1}{2}$ |        |               |
| 4325            | +4.4   | $\frac{1}{2}$ |        |               |        |               | +17.8  | $\frac{1}{2}$ |        |               |        |               | +17.8  | $\frac{1}{2}$ |
| 4340            |        |               |        |               | +27.0  | $\frac{1}{2}$ |        |               |        |               | +28.1  | $\frac{1}{2}$ |        |               |
| 4352            | +5.6   | $\frac{1}{2}$ | +13.7  | $\frac{1}{2}$ |        |               |        |               |        |               | +22.8  | $\frac{1}{2}$ | +13.6  | $\frac{1}{2}$ |
| 4401            | +13.0  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               |        |               |        |               |
| 4415            | +18.9  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               |        |               |        |               |
| 4468            |        |               |        |               |        |               |        |               |        |               | +25.8  | $\frac{1}{2}$ |        |               |
| 4481            | +17.1  | 1             | +23.3  | $\frac{1}{2}$ | +10.2  | $\frac{1}{2}$ | +25.8  | $\frac{1}{2}$ |        |               | +28.1  | $\frac{1}{2}$ | +23.8  | $\frac{1}{2}$ |
| 4501            | +21.7  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               | +12.8  | $\frac{1}{2}$ | +28.4  | $\frac{1}{2}$ |
| 4508            | +12.8  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               |        |               |        |               |
| 4522            | +0.2   | $\frac{1}{2}$ | +9.2   | $\frac{1}{2}$ |        |               |        |               |        |               | +18.2  | $\frac{1}{2}$ |        |               |
| 4531            |        |               |        |               |        |               |        |               |        |               | +21.7  | $\frac{1}{2}$ |        |               |
| 4549            | +2.6   | $\frac{1}{2}$ | +3.9   | $\frac{1}{2}$ | +13.0  | $\frac{1}{2}$ | +24.9  | $\frac{1}{2}$ |        |               | +19.7  | $\frac{1}{2}$ | +18.3  | $\frac{1}{2}$ |
| 4572            | +26.6  | $\frac{1}{2}$ | +11.9  | $\frac{1}{2}$ |        |               |        |               |        |               |        |               |        |               |
| Weighted mean   | +11.35 |               | +10.50 |               | +15.75 |               | +18.21 |               | +18.46 |               | +21.98 |               | +19.98 |               |
| $V_2$           | +8.20  |               | +7.76  |               | +5.71  |               | +3.27  |               | +2.22  |               | -0.74  |               | -1.79  |               |
| $V_2$           | -0.15  |               | -0.12  |               | -0.21  |               | -0.18  |               | -0.15  |               | +0.14  |               | +0.07  |               |
| Curv.           | -0.28  |               | -0.28  |               | -0.28  |               | -0.28  |               | -0.28  |               | -0.28  |               | -0.28  |               |
| Radial Velocity | +19.1  |               | +17.9  |               | +21.0  |               | +21.0  |               | +20.2  |               | +21.1  |               | +18.0  |               |

## MEASURES OF 40 AURIGÆ—Continued

| X               | 6668    |    |           |    | 6673   |    | 6704   |    | 6727   |    | 6732    |    |           |    |
|-----------------|---------|----|-----------|----|--------|----|--------|----|--------|----|---------|----|-----------|----|
|                 | Primary |    | Secondary |    | Vel    | Wt | Vel    | Wt | Vel    | Wt | Primary |    | Secondary |    |
|                 | Vel     | Wt | Vel       | Wt |        |    |        |    |        |    | Vel     | Wt | Vel       | Wt |
| 4005            | -42.0   | 1  | +99.1     | 1  |        |    | +46.9  | 1  | +35.8  | 1  | +7.2    | 1  | +78.7     | 1  |
| 4030            |         |    |           |    |        |    |        |    |        |    |         |    |           |    |
| 4045            | -34.6   | 1  | +97.6     | 1  | +5.3   | 1  | +28.4  | 1  |        |    | -0.8    | 1  | +68.6     | 1  |
| 4063            | -46.8   | 1  | +80.3     | 1  |        |    |        |    | +21.7  | 1  |         |    |           |    |
| 4071            | -38.9   | 1  | +98.3     | 1  |        |    |        |    |        |    | +11.6   | 1  |           |    |
| 4077            | -37.4   | 1  | +89.5     | 1  | +0.9   | 1  | +26.5  | 1  | +21.9  | 1  |         |    |           |    |
| 4143            | -30.6   | 1  | +98.0     | 1  |        |    |        |    |        |    | -6.8    | 1  | +95.4     | 1  |
| 4198            | -42.4   | 1  |           |    |        |    |        |    | +36.5  | 1  |         |    |           |    |
| 4202            |         |    |           |    | +16.7  | 1  |        |    | +28.7  | 1  |         |    |           |    |
| 4215            |         |    |           |    | +15.3  | 1  |        |    |        |    |         |    |           |    |
| 4250            |         |    |           |    |        |    | +26.6  | 1  | +24.8  | 1  |         |    |           |    |
| 4260            |         |    |           |    |        |    | +26.4  | 1  |        |    | +3.2    | 1  | +77.6     | 1  |
| 4260            |         |    |           |    |        |    |        |    | +26.3  | 1  | +13.0   | 1  | +115.5    | 1  |
| 4271            | -31.8   | 1  | +99.3     | 1  |        |    | +26.9  | 1  | +29.4  | 1  |         |    |           |    |
| 4289            | -34.8   | 1  | +96.7     | 1  |        |    | +38.1  | 1  |        |    | +19.1   | 1  | +97.4     | 1  |
| 4308            | -31.6   | 1  |           |    |        |    |        |    |        |    |         |    |           |    |
| 4325            |         |    |           |    | +5.5   | 1  |        |    | +22.3  | 1  |         |    |           |    |
| 4310            |         |    |           |    |        |    |        |    | +22.5  | 1  |         |    |           |    |
| 4352            |         |    |           |    |        |    | +31.9  | 1  | +45.6  | 1  |         |    |           |    |
| 4481            |         |    |           |    |        |    | +28.4  | 1  | +28.4  | 1  |         |    |           |    |
| 4501            |         |    |           |    |        |    | +38.4  | 1  |        |    |         |    |           |    |
| 4522            |         |    |           |    |        |    | +23.0  | 1  |        |    |         |    |           |    |
| 4534            |         |    |           |    |        |    | +32.4  | 1  |        |    |         |    |           |    |
| 4549            | -45.9   | 1  | +97.1     | 1  | +11.7  | 1  | +28.6  | 1  | +28.6  | 1  |         |    |           |    |
| 4572            |         |    |           |    | +15.7  | 1  |        |    | +26.2  | 1  |         |    |           |    |
|                 |         |    |           |    |        |    |        |    | +32.0  | 1  |         |    |           |    |
| Weighted mean   | -37.66  |    | +95.61    |    | +10.57 |    | +30.49 |    | +28.71 |    | +7.05   |    | +88.83    |    |
| V <sub>a</sub>  | -4.32   |    | -4.32     |    | -4.82  |    | -9.80  |    | -15.79 |    | -16.16  |    | -16.16    |    |
| V <sub>d</sub>  | +0.10   |    | +0.10     |    | -0.06  |    | -0.08  |    | -0.21  |    | -0.07   |    | -0.07     |    |
| Curv.           | -0.28   |    | -0.28     |    | -0.28  |    | -0.28  |    | -0.28  |    | -0.28   |    | -0.28     |    |
| Radial Velocity | -42.2   |    | +91.1     |    | +5.4   |    | +20.4  |    | +12.4  |    | -9.5    |    | +72.3     |    |



MEASURES OF 40 AURIGAE—Continued

| λ               | 6715    |    |           |    | 6751   |    | 6762   |    | 6768   |    | 6806   |    | 6811   |    |
|-----------------|---------|----|-----------|----|--------|----|--------|----|--------|----|--------|----|--------|----|
|                 | Primary |    | Secondary |    | Vel    | Wt | Vel    | Wt | Vel    | Wt | Vel    | Wt | Vel    | Wt |
|                 | Vel     | Wt | Vel       | Wt |        |    |        |    |        |    |        |    |        |    |
| 1005            | -30.9   | ½  |           |    |        |    | -30.7  | 1  | +55.5  | ½  | +56.3  | ½  | +48.7  | ½  |
| 1045            | -31.6   | ½  |           |    |        |    | -33.2  | 1  |        |    | +49.0  | ½  |        |    |
| 1063            | -28.8   | ½  |           |    |        |    | -31.0  | 1  | +40.8  | ½  | +41.2  | 1  | +33.3  | 1  |
| 4077            | -20.1   | ½  | +94.0     | ½  | +10.0  | ½  | -32.6  | ½  |        |    | +40.7  | ½  | +43.8  | ½  |
| 4143            | -27.7   | ½  | +116.4    | ½  |        |    | -31.7  | ½  | +51.0  | ½  | +43.8  | ½  | +40.0  | ½  |
| 4198            |         |    |           |    | +20.4  | ½  | -33.2  | 1  | +43.5  | ½  | +31.4  | ½  | +37.5  | 1  |
| 4202            |         |    |           |    |        |    | -51.7  | ½  |        |    | +15.1  | 1  |        |    |
| 4215            | -33.6   | ½  | +123.0    | ½  |        |    | -36.8  | 1  | +50.8  | ½  |        |    | +50.2  | ½  |
| 4233            |         |    |           |    | +10.1  | ½  |        |    |        |    | +39.7  | ½  |        |    |
| 4250            |         |    |           |    |        |    | -23.7  | ½  | +34.2  | ½  | +49.4  | ½  | +28.5  | ½  |
| 4260            |         |    |           |    |        |    | -29.7  | ½  |        |    |        |    |        |    |
| 4271            | -40.2   | ½  | +103.6    | ½  |        |    | -33.9  | 1  |        |    | +39.2  | ½  | +29.6  | ½  |
| 4289            |         |    |           |    |        |    | -34.9  | 1  | +55.3  | ½  | +41.3  | ½  | +31.6  | 1  |
| 4308            |         |    | +107.4    | ½  |        |    | -38.9  | ½  |        |    |        |    |        |    |
| 4325            |         |    |           |    |        |    | -43.4  | ½  |        |    | +12.8  | ½  |        |    |
| 4340            |         |    |           |    | +28.2  | ½  | -18.7  | 1  |        |    |        |    | +40.1  | ½  |
| 4395            |         |    |           |    |        |    |        |    | +12.8  | ½  |        |    | +56.6  | ½  |
| 4481            |         |    |           |    | +25.8  | ½  | -34.0  | 1  |        |    |        |    |        |    |
| 4501            |         |    |           |    | +16.6  | ½  |        |    |        |    |        |    |        |    |
| 4522            | -30.7   | ½  | +117.4    | ½  | +36.0  | ½  |        |    |        |    |        |    | +30.5  | ½  |
| 4534            |         |    |           |    |        |    | -28.6  | ½  |        |    |        |    | +43.3  | ½  |
| 4549            |         |    |           |    | +26.2  | ½  | -21.9  | ½  |        |    |        |    | +49.3  | ½  |
| 4572            |         |    |           |    |        |    | -45.3  | ½  | +37.3  | ½  |        |    |        |    |
| Weighted mean   | -30.20  |    | +110.30   |    | +21.50 |    | +31.16 |    | +45.76 |    | +43.31 |    | +38.60 |    |
| V <sub>s</sub>  | -17.44  |    | -17.44    |    | -17.85 |    | -18.59 |    | -20.12 |    | -25.03 |    | -25.32 |    |
| V <sub>a</sub>  | -0.19   |    | -0.19     |    | -0.21  |    | -0.10  |    | -0.48  |    | -0.03  |    | -0.21  |    |
| Curv.           | -0.28   |    | -0.28     |    | -0.28  |    | -0.28  |    | -0.28  |    | -0.28  |    | -0.28  |    |
| Radial Velocity | -48.1   |    | +92.4     |    | +3.2   |    | +15.2  |    | +25.2  |    | +18.0  |    | +12.8  |    |

MEASURES OF 40 AURIGÆ—*Continued*

| $\lambda$       | 6841   |     | 6884    |     |           |     | 6887    |     |           |     | 6938    |     |           |     |
|-----------------|--------|-----|---------|-----|-----------|-----|---------|-----|-----------|-----|---------|-----|-----------|-----|
|                 |        |     | Primary |     | Secondary |     | Primary |     | Secondary |     | Primary |     | Secondary |     |
|                 | Vel    | Wt  | Vel     | Wt  | Vel       | Wt  | Vel     | Wt  | Vel       | Wt  | Vel     | Wt  | Vel       | Wt  |
| 4005            |        |     |         |     |           |     | -23.8   | 1/2 | +125.6    | 1/4 | -16.4   | 1/2 | +107.6    | 1/4 |
| 4030            |        |     | +9.2    | 1/2 |           |     |         |     |           |     | -20.1   | 1/2 |           |     |
| 4045            | +22.2  | 1/2 | +4.7    | 1/2 |           |     | -20.1   | 1/2 |           |     | -15.1   | 1/2 |           |     |
| 4063            | +11.8  | 1/2 | -3.5    | 1/2 |           |     |         |     |           |     | -16.4   | 1/2 | +120.5    | 1/4 |
| 4077            | +27.4  | 1/2 | +14.6   | 1/2 | +125.4    | 1/4 | -21.9   | 1/2 | +107.7    | 1/2 | -15.1   | 1/2 |           |     |
| 4143            | +29.3  | 1/2 | +10.5   | 1/2 |           |     | -18.0   | 1/2 | +139.6    | 1/4 | -19.0   | 1/2 | +116.4    | 1/4 |
| 4215            |        |     | +9.2    | 1/2 | +99.4     | 1/4 | -19.1   | 1/2 | +122.0    | 1/2 |         |     |           |     |
| 4260            |        |     | -7.5    | 1/2 | +103.0    | 1/4 | -36.2   | 1/2 | +92.4     | 1/2 | -23.5   | 1/2 | +98.8     | 1/4 |
| 4271            |        |     |         |     |           |     | -16.6   | 1/2 | +124.0    | 1/2 |         |     |           |     |
| 4289            | +39.0  | 1/2 |         |     |           |     | -17.0   | 1/2 | +122.4    | 1/2 | -19.7   | 1/2 | +124.5    | 1/4 |
| 4325            |        |     | -6.7    | 1/2 | +90.3     | 1/4 |         |     |           |     | -14.4   | 1/2 |           |     |
| 4310            | +32.6  | 1/2 |         |     |           |     | -21.4   | 1/2 |           |     |         |     |           |     |
| 4445            |        |     |         |     |           |     | -23.9   | 1/2 | +133.2    | 1/4 |         |     |           |     |
| 4522            |        |     |         |     |           |     | -48.0   | 1/2 | +128.3    | 1/4 |         |     |           |     |
| 4549            | +22.3  | 1/2 |         |     |           |     | -30.2   | 1/2 | +115.8    | 1/4 |         |     |           |     |
| Weighted mean   | +26.37 |     | +4.13   |     | +104.45   |     | -24.95  |     | +120.57   |     | -16.92  |     | +114.97   |     |
| $V_x$           | -25.53 |     | -28.50  |     | -28.50    |     | -28.84  |     | -28.84    |     | -25.05  |     | -25.05    |     |
| $V_y$           | -0.10  |     | -0.20   |     | -0.20     |     | -0.45   |     | -0.45     |     | -0.21   |     | -0.21     |     |
| Curv.           | -0.28  |     | -0.28   |     | -0.28     |     | -0.28   |     | -0.28     |     | -0.28   |     | -0.28     |     |
| Radial Velocity | +0.4   |     | -24.8   |     | +75.4     |     | -51.2   |     | +91.4     |     | -42.5   |     | +89.4     |     |

MEASURES OF 40 AURIGAE. *Continued*

| λ               | 6946    |     |           |     | 7226    |     |           |     | 7324    |     |           |     | 7330   |     |
|-----------------|---------|-----|-----------|-----|---------|-----|-----------|-----|---------|-----|-----------|-----|--------|-----|
|                 | Primary |     | Secondary |     | Primary |     | Secondary |     | Primary |     | Secondary |     | Vel    | wt. |
|                 | Vel     | Wt  | Vel       | Wt  | Vel     | Wt  | Vel       | Wt  | Vel     | Wt  | Vel       | Wt  |        |     |
| 4005            | -59.1   | 1/2 | +116.5    | 1/2 | -100.7  | 1/2 |           |     | -51.7   | 1/2 |           |     | -20.0  | 1/2 |
| 4045            | -49.7   | 1/2 | +148.1    | 1/2 | -113.9  | 1/2 |           |     | -53.2   | 1/2 | +43.9     | 1/2 |        |     |
| 4061            |         |     |           |     | -110.7  | 1/2 |           |     | -52.8   | 1/2 |           |     |        |     |
| 4071            |         |     |           |     |         |     |           |     | -60.8   | 1/2 |           |     |        |     |
| 4077            | -12.9   | 1/2 | +131.5    | 1/2 | -81.7   | 1/2 | +75.4     | 1/2 | -47.5   | 1/2 | +61.8     | 1/2 | -21.0  | 1/2 |
| 4143            | -31.1   | 1/2 | +129.4    | 1/2 | -88.5   | 1/2 | +83.7     | 1/2 | -48.8   | 1/2 |           |     | -17.9  | 1/2 |
| 4198            | -44.4   | 1/2 |           |     |         |     |           |     |         |     |           |     |        |     |
| 4215            | -32.9   | 1/2 |           |     | -97.0   | 1/2 |           |     | -51.8   | 1/2 | +56.4     | 1/2 | -25.6  | 1/2 |
| 4236            | -40.5   | 1/2 |           |     |         |     |           |     |         |     |           |     | -18.8  | 1/2 |
| 4260            |         |     |           |     |         |     |           |     | -65.9   | 1/2 |           |     |        |     |
| 4271            |         |     |           |     | -87.0   | 1/2 |           |     | -51.0   | 1/2 |           |     | -11.2  | 1/2 |
| 4289            | -55.1   | 1/2 |           |     | -86.6   | 1/2 |           |     |         |     |           |     | -27.2  | 1/2 |
| 4308            |         |     |           |     |         |     |           |     | -53.5   | 1/2 | +46.3     | 1/2 |        |     |
| 4310            | -58.3   | 1/2 |           |     |         |     |           |     |         |     |           |     | -21.1  | 1/2 |
| 4404            |         |     |           |     |         |     |           |     |         |     |           |     | -23.9  | 1/2 |
| 4415            |         |     |           |     |         |     |           |     |         |     |           |     |        |     |
| 4481            | -39.2   | 1/2 | +141.0    | 1/2 | -86.0   | 1/2 | +81.8     | 1/2 |         |     |           |     |        |     |
| 4519            |         |     |           |     | -92.8   | 1/2 |           |     |         |     |           |     |        |     |
| 4572            | -32.8   | 1/2 |           |     |         |     |           |     |         |     |           |     | -18.0  | 1/2 |
| Weighted mean   | -42.46  |     | +133.30   |     | -91.16  |     | +81.90    |     | -53.70  |     | +52.85    |     | -20.67 |     |
| V <sub>1</sub>  | -24.79  |     | -21.79    |     | +27.85  |     | +27.85    |     | +27.50  |     | +27.50    |     | +27.45 |     |
| V <sub>2</sub>  | -0.23   |     | -0.23     |     | +0.22   |     | +0.22     |     | +0.07   |     | +0.07     |     | +0.21  |     |
| Curv.           | -0.28   |     | -0.28     |     | -0.28   |     | -0.28     |     | -0.28   |     | -0.28     |     | -0.28  |     |
| Radial Velocity | -67.8   |     | +108.0    |     | -66.4   |     | +109.7    |     | -26.3   |     | +80.2     |     | +6.7   |     |

## MEASURES OF 40 AURIGÆ—Continued

| X               | 7336   |               | 7374    |               |           |               | 7383    |               |           |               | 7438    |               |           |               |
|-----------------|--------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|
|                 |        |               | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |
|                 | Vel.   | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           |
| 1005            |        |               |         |               |           |               | -62.0   | $\frac{1}{2}$ | +47.9     | $\frac{1}{2}$ | -51.3   | $\frac{1}{2}$ | ...       |               |
| 1033            |        |               | -45.8   | $\frac{1}{2}$ | +41.0     | $\frac{1}{2}$ |         |               |           |               |         |               |           |               |
| 1045            | -8.0   | $\frac{1}{2}$ | -39.5   | $\frac{1}{2}$ | +46.1     | $\frac{1}{2}$ | -59.9   | $\frac{1}{2}$ |           |               | -53.2   | $\frac{1}{2}$ | +71.0     | $\frac{1}{2}$ |
| 1063            | -10.8  | $\frac{1}{2}$ |         |               | +49.6     | $\frac{1}{2}$ | -61.3   | $\frac{1}{2}$ | +63.4     | $\frac{1}{2}$ | -58.6   | $\frac{1}{2}$ | +76.2     | $\frac{1}{2}$ |
| 1071            |        |               |         |               |           |               |         |               |           |               |         |               | +88.1     | $\frac{1}{2}$ |
| 1077            | -10.9  | $\frac{1}{2}$ |         |               |           |               | -57.5   | $\frac{1}{2}$ | +78.5     | $\frac{1}{2}$ | -42.0   | $\frac{1}{2}$ | +75.8     | $\frac{1}{2}$ |
| 1113            |        |               |         |               | +53.7     | $\frac{1}{2}$ | -64.3   | $\frac{1}{2}$ | +52.2     | $\frac{1}{2}$ |         |               |           |               |
| 1191            |        |               | -15.0   | $\frac{1}{2}$ | +32.0     | $\frac{1}{2}$ | -69.0   | $\frac{1}{2}$ |           |               | -62.0   | $\frac{1}{2}$ | +82.0     | $\frac{1}{2}$ |
| 1198            | -13.1  | $\frac{1}{2}$ |         |               |           |               | -72.9   | $\frac{1}{2}$ |           |               |         |               |           |               |
| 1215            | -17.9  | $\frac{1}{2}$ | -19.8   | $\frac{1}{2}$ |           |               | -58.5   | $\frac{1}{2}$ | +66.2     | $\frac{1}{2}$ | -56.3   | $\frac{1}{2}$ | +77.6     | $\frac{1}{2}$ |
| 1233            |        |               |         |               |           |               |         |               |           |               | -52.0   | $\frac{1}{2}$ |           |               |
| 1236            | -13.6  | $\frac{1}{2}$ |         |               |           |               |         |               |           |               |         |               |           |               |
| 1260            | -19.1  | $\frac{1}{2}$ |         |               |           |               | -68.0   | $\frac{1}{2}$ | +55.3     | $\frac{1}{2}$ | -73.8   | $\frac{1}{2}$ |           |               |
| 1271            | -18.8  | $\frac{1}{2}$ |         |               |           |               |         |               | +81.5     | $\frac{1}{2}$ | -61.2   | $\frac{1}{2}$ |           |               |
| 1289            | -10.9  | $\frac{1}{2}$ |         |               |           |               | -62.6   | $\frac{1}{2}$ | +59.3     | $\frac{1}{2}$ | -70.2   | $\frac{1}{2}$ |           |               |
| 1308            |        |               |         |               |           |               |         |               |           |               | -59.0   | $\frac{1}{2}$ |           |               |
| 1310            |        |               |         |               |           |               |         |               | +78.0     | $\frac{1}{2}$ | -61.1   | $\frac{1}{2}$ | +83.7     | $\frac{1}{2}$ |
| 1352            |        |               |         |               |           |               |         |               |           |               | -52.5   | $\frac{1}{2}$ | +108.0    | $\frac{1}{2}$ |
| 1481            |        |               | -48.5   | $\frac{1}{2}$ | +48.7     | $\frac{1}{2}$ |         |               |           |               | -48.8   | $\frac{1}{2}$ | +97.6     | $\frac{1}{2}$ |
| 1531            | -9.7   | $\frac{1}{2}$ |         |               |           |               |         |               |           |               |         |               |           |               |
| 1549            | -15.7  | $\frac{1}{2}$ |         |               |           |               | -65.6   | $\frac{1}{2}$ |           |               | -64.3   | $\frac{1}{2}$ |           |               |
| Weighted mean   | -13.50 |               | -45.27  |               | +38.35    |               | -63.78  |               | +64.70    |               | -57.76  |               | +84.44    |               |
| V <sub>r</sub>  | +27.29 |               | +21.67  |               | +21.67    |               | +20.64  |               | +20.64    |               | +9.67   |               | +9.67     |               |
| V <sub>t</sub>  | +0.11  |               | +0.13   |               | +0.13     |               | +0.05   |               | +0.05     |               | -0.20   |               | -0.20     |               |
| Curv.           | -0.28  |               | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               |
| Radial Velocity | +13.6  |               | -23.7   |               | +59.9     |               | -43.4   |               | +85.1     |               | -48.6   |               | +93.6     |               |

MEASURES OF 40 AURIGÆ—*Continued*

| λ               | 7439    |               |           |               | 7441    |               |           |               | 7444    |               |           |               | Vel. | Wt. |
|-----------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|------|-----|
|                 | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |      |     |
|                 | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           |      |     |
| 4005            |         |               |           |               | -68.0   | $\frac{1}{2}$ | +113.3    | $\frac{1}{2}$ |         |               |           |               |      |     |
| 4033            | -59.6   | $\frac{1}{2}$ |           |               | -64.1   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 4045            | -71.8   | $\frac{1}{2}$ |           |               | -72.7   | $\frac{1}{2}$ | +115.6    | $\frac{1}{2}$ | -75.0   | $\frac{1}{2}$ |           |               |      |     |
| 4071            | -45.4   | $\frac{1}{2}$ | +100.8    | $\frac{1}{2}$ |         |               |           |               |         |               |           |               |      |     |
| 4077            |         |               |           |               | -80.0   | $\frac{1}{2}$ | +94.1     | $\frac{1}{2}$ | -69.6   | $\frac{1}{2}$ | +96.3     | $\frac{1}{2}$ |      |     |
| 4143            |         |               |           |               | -76.4   | $\frac{1}{2}$ | +108.8    | $\frac{1}{2}$ | -66.7   | $\frac{1}{2}$ | +102.5    | $\frac{1}{2}$ |      |     |
| 4245            | -64.1   | $\frac{1}{2}$ | +91.8     | $\frac{1}{2}$ |         |               |           |               | -64.1   | $\frac{1}{2}$ |           |               |      |     |
| 4236            | -77.0   |               |           |               | -73.8   | $\frac{1}{2}$ | +117.5    | $\frac{1}{2}$ |         |               | +104.7    | $\frac{1}{2}$ |      |     |
| 4250            | -73.8   | $\frac{1}{2}$ | +79.1     | $\frac{1}{2}$ |         |               | +96.0     | $\frac{1}{2}$ |         |               |           |               |      |     |
| 4260            | -82.9   | $\frac{1}{2}$ |           |               |         |               |           |               |         |               |           |               |      |     |
| 4289            | -66.4   | $\frac{1}{2}$ |           |               | -75.1   | $\frac{1}{2}$ | +100.1    | $\frac{1}{2}$ | -71.3   | $\frac{1}{2}$ | +90.0     | $\frac{1}{2}$ |      |     |
| 4308            | -49.6   | $\frac{1}{2}$ |           |               | -75.6   | $\frac{1}{2}$ |           |               | -84.4   | $\frac{1}{2}$ | +93.8     | $\frac{1}{2}$ |      |     |
| 4325            |         |               |           |               | -80.5   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 4340            |         |               |           |               | -56.0   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 4352            |         |               |           |               | -84.4   | $\frac{1}{2}$ | +106.1    | $\frac{1}{2}$ |         |               |           |               |      |     |
| 4395            |         |               |           |               | -76.0   | $\frac{1}{2}$ | +111.3    | $\frac{1}{2}$ | -93.9   | $\frac{1}{2}$ | +111.4    | $\frac{1}{2}$ |      |     |
| 4481            | -40.0   | $\frac{1}{2}$ | +95.0     | $\frac{1}{2}$ | -82.1   | $\frac{1}{2}$ | +107.6    | $\frac{1}{2}$ | -84.0   | $\frac{1}{2}$ |           |               |      |     |
| 4549            | -72.2   | $\frac{1}{2}$ | +78.7     | $\frac{1}{2}$ | -68.2   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| Weighted mean   | -63.89  |               | +91.08    |               | -73.78  |               | +107.07   |               | -76.12  |               | +99.75    |               |      |     |
| V <sub>a</sub>  | +9.65   |               | +9.65     |               | +9.33   |               | +9.33     |               | +9.24   |               | +9.24     |               |      |     |
| V <sub>r</sub>  | -0.22   |               | -0.22     |               | +0.12   |               | +0.12     |               | -0.08   |               | -0.08     |               |      |     |
| Curv.           | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               |      |     |
| Radial Velocity | -54.7   |               | +100.2    |               | -64.6   |               | +116.2    |               | -67.2   |               | +108.6    |               |      |     |

MEASURES OF 40 AURIGÆ—*Continued*

| X                  | 7166    |               |           |               | 7467    |               |           |               | 7497    |               |           |               |      |     |
|--------------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|------|-----|
|                    | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |      |     |
|                    | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel. | Wt. |
| 1005               | -19.7   | $\frac{1}{2}$ | +63.7     | $\frac{1}{2}$ | -20.0   | $\frac{1}{2}$ | +72.5     | $\frac{1}{2}$ | -26.5   | $\frac{1}{2}$ | +129.1    | $\frac{1}{2}$ |      |     |
| 1030               |         |               |           |               | -20.5   | $\frac{1}{2}$ |           |               | -31.1   | $\frac{1}{2}$ |           |               |      |     |
| 1033               |         |               |           |               |         |               |           |               | -12.4   | $\frac{1}{2}$ |           |               |      |     |
| 1045               | -26.2   | $\frac{1}{2}$ | +70.1     | $\frac{1}{2}$ |         |               |           |               | -35.0   | $\frac{1}{2}$ |           |               |      |     |
| 1063               | -18.9   | $\frac{1}{2}$ | +81.6     | $\frac{1}{2}$ | -23.0   | $\frac{1}{2}$ | +72.2     | $\frac{1}{2}$ |         |               | +105.5    | $\frac{1}{2}$ |      |     |
| 1071               | -26.8   | $\frac{1}{2}$ |           |               |         |               |           |               |         |               | +99.9     | $\frac{1}{2}$ |      |     |
| 1077               | -32.5   | $\frac{1}{2}$ | +83.1     | $\frac{1}{2}$ |         |               |           |               | -28.3   | $\frac{1}{2}$ | +121.4    | $\frac{1}{2}$ |      |     |
| 1101               |         |               |           |               |         |               |           |               | -15.9   | $\frac{1}{2}$ |           |               |      |     |
| 1113               | -17.9   | $\frac{1}{2}$ |           |               | -29.0   | $\frac{1}{2}$ | +67.7     | $\frac{1}{2}$ | -21.3   | $\frac{1}{2}$ | +123.8    | $\frac{1}{2}$ |      |     |
| 1191               | -36.0   | $\frac{1}{2}$ |           |               | -14.0   | $\frac{1}{2}$ | +72.0     | $\frac{1}{2}$ | -30.0   | $\frac{1}{2}$ |           |               |      |     |
| 1205               |         |               |           |               | -36.6   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 1215               | -25.1   | $\frac{1}{2}$ | +92.3     | $\frac{1}{2}$ |         |               |           |               | -26.7   | $\frac{1}{2}$ | +108.8    | $\frac{1}{2}$ |      |     |
| 1233               |         |               |           |               | -25.4   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 1236               |         |               |           |               |         |               |           |               |         |               | +134.8    | $\frac{1}{2}$ |      |     |
| 1250               | -20.6   | $\frac{1}{2}$ | +67.0     | $\frac{1}{2}$ | -9.5    | $\frac{1}{2}$ | +91.8     | $\frac{1}{2}$ | -35.3   | $\frac{1}{2}$ | +111.3    | $\frac{1}{2}$ |      |     |
| 1260               | -31.5   | $\frac{1}{2}$ | +71.1     | $\frac{1}{2}$ |         |               | +79.7     | $\frac{1}{2}$ |         |               | +109.5    | $\frac{1}{2}$ |      |     |
| 1271               | -49.3   | $\frac{1}{2}$ | +74.8     | $\frac{1}{2}$ | -26.8   | $\frac{1}{2}$ | +83.7     | $\frac{1}{2}$ | -29.5   | $\frac{1}{2}$ | +97.1     | $\frac{1}{2}$ |      |     |
| 1290               | -37.0   | $\frac{1}{2}$ |           |               |         |               |           |               | -32.4   | $\frac{1}{2}$ | +119.7    | $\frac{1}{2}$ |      |     |
|                    |         |               |           |               |         |               |           |               |         |               | +99.8     | $\frac{1}{2}$ |      |     |
|                    |         |               |           |               |         |               |           |               | -33.5   | $\frac{1}{2}$ |           |               |      |     |
|                    |         |               |           |               |         |               |           |               | -35.6   | $\frac{1}{2}$ | +135.2    | $\frac{1}{2}$ |      |     |
|                    |         |               |           |               |         |               |           |               | -37.5   | $\frac{1}{2}$ | +158.3    | $\frac{1}{2}$ |      |     |
|                    |         |               |           |               |         |               |           |               | -34.1   | $\frac{1}{2}$ | +116.8    | $\frac{1}{2}$ |      |     |
| Weighted<br>mean   | -28.71  |               | +75.50    |               | -22.75  |               | +77.10    |               | -31.11  |               | +117.10   |               |      |     |
| $V_a$              | -4.27   |               | -4.27     |               | -4.30   |               | -4.30     |               | -17.72  |               | -17.72    |               |      |     |
| $V_d$              | +0.08   |               | +0.08     |               | -0.02   |               | -0.02     |               | -0.18   |               | -0.18     |               |      |     |
| Curv.              | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               | -0.28   |               | -0.28     |               |      |     |
| Radial<br>Velocity | -33.2   |               | +71.1     |               | -27.2   |               | +72.5     |               | -49.3   |               | +99.2     |               |      |     |

MEASURES OF 40 AURIGAE—Continued

| λ               | 7498    |       |           |       | 7521    |       |           |       | 7525    |       |           |       |       |       |
|-----------------|---------|-------|-----------|-------|---------|-------|-----------|-------|---------|-------|-----------|-------|-------|-------|
|                 | Primary |       | Secondary |       | Primary |       | Secondary |       | Primary |       | Secondary |       |       |       |
|                 | Vel.    | Wt.   | Vel.      | Wt.   | Vel.    | Wt.   | Vel.      | Wt.   | Vel.    | Wt.   | Vel.      | Wt.   | Vel.  | Wt.   |
| 4005            | -32.9   | 1/2   | .....     | ..... | - 4.3   | 1/2   | +108.6    | 1/2   | + 0.4   | 1/2   | +91.3     | 1/2   | ..... | ..... |
| 4030            | .....   | ..... | .....     | ..... | +15.8   | 1/2   | + 85.8    | 1/2   | + 6.8   | 1/2   | +90.7     | 1/2   | ..... | ..... |
| 4033            | .....   | ..... | .....     | ..... | - 6.1   | 1/2   | .....     | ..... | .....   | ..... | .....     | ..... | ..... | ..... |
| 4045            | -13.9   | 1/2   | .....     | ..... | .....   | ..... | .....     | ..... | + 9.3   | 1/2   | +93.1     | 1/2   | ..... | ..... |
| 4063            | -39.7   | 1/2   | .....     | ..... | + 9.0   | 1/2   | + 95.7    | 1/2   | 0.0     | 1/2   | .....     | ..... | ..... | ..... |
| 4071            | .....   | ..... | .....     | ..... | +13.6   | 1/2   | .....     | ..... | + 8.2   | 1/2   | .....     | ..... | ..... | ..... |
| 4077            | -36.5   | 1/2   | +115.0    | 1/2   | + 3.7   | 1/2   | .....     | ..... | .....   | ..... | .....     | ..... | ..... | ..... |
| 4143            | -24.3   | 1/2   | +120.8    | 1/2   | .....   | ..... | .....     | ..... | + 6.8   | 1/2   | .....     | ..... | ..... | ..... |
| 4191            | -33.5   | 1/2   | +113.0    | 1/2   | .....   | ..... | .....     | ..... | +11.3   | 1/2   | .....     | ..... | ..... | ..... |
| 4215            | -37.1   | 1/2   | +118.0    | 1/2   | + 6.1   | 1/2   | .....     | ..... | + 7.1   | 1/2   | .....     | ..... | ..... | ..... |
| 4260            | -37.2   | 1/2   | .....     | ..... | .....   | ..... | .....     | ..... | .....   | ..... | .....     | ..... | ..... | ..... |
| 4271            | -49.8   | 1/2   | +105.2    | 1/2   | +11.0   | 1/2   | +126.9    | 1/2   | .....   | ..... | .....     | ..... | ..... | ..... |
| 4290            | -30.5   | 1/2   | .....     | ..... | .....   | ..... | .....     | ..... | .....   | ..... | .....     | ..... | ..... | ..... |
| 4307            | -39.2   | 1/2   | +105.9    | 1/2   | .....   | ..... | .....     | ..... | .....   | ..... | .....     | ..... | ..... | ..... |
| 4340            | -39.1   | 1/2   | +102.2    | 1/2   | .....   | ..... | .....     | ..... | - 0.6   | 1/2   | .....     | ..... | ..... | ..... |
| 4351            | .....   | ..... | +131.1    | 1/2   | .....   | ..... | .....     | ..... | - 6.8   | 1/2   | .....     | ..... | ..... | ..... |
| Weighted mean   | - 35.97 |       | +113.90   |       | + 6.47  |       | +101.25   |       | + 4.15  |       | + 92.00   |       | ..... | ..... |
| V <sub>a</sub>  | - 17.74 |       | - 17.74   |       | - 26.93 |       | - 26.93   |       | - 26.91 |       | - 26.94   |       | ..... | ..... |
| V <sub>d</sub>  | - 0.21  |       | - 0.21    |       | - 0.07  |       | - 0.07    |       | - 0.14  |       | - 0.44    |       | ..... | ..... |
| Curv            | - 0.28  |       | - 0.28    |       | - 0.28  |       | - 0.28    |       | - 0.28  |       | - 0.28    |       | ..... | ..... |
| Radial Velocity | - 54.2  |       | + 95.7    |       | - 20.8  |       | + 77.0    |       | - 23.2  |       | + 64.4    |       | ..... | ..... |

MEASURES OF 40 AURIGÆ *Continued*

| λ                  | 7526    |               |           |               | 7576    |               |           |               | 7787    |               |           |               |       |       |
|--------------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|-------|-------|
|                    | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |       |       |
|                    | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.  | Wt.   |
| 4005               |         |               |           |               | -32.5   | $\frac{1}{2}$ | +143.6    | $\frac{1}{4}$ | -63.9   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4030               |         |               |           |               | -30.6   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4033               |         |               |           |               | -32.9   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4045               | + 0.9   | $\frac{1}{2}$ | + 81.6    | $\frac{1}{4}$ | -28.8   | $\frac{1}{2}$ | +160.4    | $\frac{1}{4}$ | -74.6   | $\frac{1}{2}$ | +47.2     | $\frac{1}{2}$ | ..... | ..... |
| 4063               | + 5.4   | $\frac{1}{2}$ | + 84.3    | $\frac{1}{4}$ | -34.7   | $\frac{1}{2}$ | +108.2    | $\frac{1}{4}$ | -50.3   | $\frac{1}{2}$ | +52.4     | $\frac{1}{2}$ | ..... | ..... |
| 4077               | + 7.3   | $\frac{1}{2}$ | .....     | .....         | -32.9   | $\frac{1}{2}$ | +121.4    | $\frac{1}{4}$ | .....   | .....         | .....     | .....         | ..... | ..... |
| 4143               |         |               |           |               | -19.3   | $\frac{1}{2}$ | +149.4    | $\frac{1}{4}$ | -50.6   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4191               |         |               |           |               | -21.5   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4202               |         |               |           |               | .....   | .....         | .....     | .....         | -67.1   | $\frac{1}{2}$ | +48.5     | $\frac{1}{4}$ | ..... | ..... |
| 4215               |         |               |           |               | -26.7   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4233               |         |               |           |               | -22.9   | $\frac{1}{2}$ | .....     | .....         | -49.1   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4250               | + 1.1   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4260               |         |               |           |               | -29.8   | $\frac{1}{2}$ | .....     | .....         | -55.0   | $\frac{1}{2}$ | +53.9     | $\frac{1}{4}$ | ..... | ..... |
| 4271               |         |               |           |               | -17.2   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4289               |         |               |           |               | -27.2   | $\frac{1}{2}$ | .....     | .....         | -79.3   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4308               |         |               |           |               | -23.7   | $\frac{1}{2}$ | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4325               | 0.0     | $\frac{1}{2}$ | + 85.0    | $\frac{1}{4}$ | .....   | .....         | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4340               | +19.8   | $\frac{1}{2}$ | +109.0    | $\frac{1}{4}$ | .....   | .....         | .....     | .....         | .....   | .....         | .....     | .....         | ..... | ..... |
| 4352               | - 5.7   | $\frac{1}{2}$ | + 95.8    | .....         | -33.7   | $\frac{1}{2}$ | +159.7    | $\frac{1}{4}$ | .....   | .....         | .....     | .....         | ..... | ..... |
| 4375               |         |               |           |               | .....   | .....         | +161.3    | $\frac{1}{4}$ | -31.6   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4481               |         |               |           |               | -18.2   | $\frac{1}{2}$ | .....     | .....         | -70.3   | $\frac{1}{2}$ | +35.8     | $\frac{1}{4}$ | ..... | ..... |
| 4501               |         |               |           |               | .....   | .....         | .....     | .....         | -34.1   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4515               |         |               |           |               | .....   | .....         | .....     | .....         | -66.4   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4531               |         |               |           |               | .....   | .....         | .....     | .....         | -41.4   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| 4549               |         |               |           |               | -24.9   | $\frac{1}{2}$ | +150.9    | $\frac{1}{4}$ | -69.3   | $\frac{1}{2}$ | .....     | .....         | ..... | ..... |
| Weighted<br>mean   | + 4.11  |               | + 91.14   |               | - 26.94 |               | +114.32   |               | - 57.36 |               | + 47.50   |               | ..... | ..... |
| V <sub>1</sub>     | - 26.95 |               | - 26.95   |               | - 28.73 |               | - 28.73   |               | + 22.86 |               | + 22.86   |               | ..... | ..... |
| V <sub>2</sub>     | - 0.20  |               | - 0.20    |               | - 0.10  |               | - 0.10    |               | + 0.24  |               | + 0.24    |               | ..... | ..... |
| Curv               | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               | ..... | ..... |
| Radial<br>Velocity | - 23.3  |               | + 63.7    |               | - 56.0  |               | +115.2    |               | - 34.5  |               | + 70.3    |               | ..... | ..... |



MEASURES OF 40 AURIGAE—Continued

| λ               | 7810    |               |           |               | 7811    |               |           |               | 7873    |               |           |               |       |       |
|-----------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|-------|-------|
|                 | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |       |       |
|                 | Vel     | Wt.           | Vel       | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel     | Wt.           | Vel.      | Wt.           | Vel.  | Wt.   |
| 4015            |         |               |           |               | - 82.1  | $\frac{1}{2}$ | +113.4    | $\frac{1}{4}$ | - 58.3  | $\frac{1}{2}$ | +28.3     | $\frac{1}{4}$ | ..... | ..... |
| 4063            | - 89.6  | $\frac{1}{2}$ | + 69.2    | $\frac{1}{4}$ |         |               |           |               | - 51.9  | $\frac{1}{2}$ | +28.1     | $\frac{1}{4}$ | ..... | ..... |
| 4071            |         |               |           |               |         |               |           |               |         |               |           |               | ..... | ..... |
| 4113            |         |               | + 83.6    | $\frac{1}{4}$ | - 71.8  | $\frac{1}{2}$ | + 91.3    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4198            | - 82.0  | $\frac{1}{2}$ |           |               |         |               |           |               |         |               |           |               | ..... | ..... |
| 4215            |         |               |           |               | - 78.7  | $\frac{1}{2}$ | + 70.3    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4233            | - 86.4  | $\frac{1}{2}$ |           |               |         |               |           |               |         |               |           |               | ..... | ..... |
| 4236            | - 88.6  | $\frac{1}{2}$ | + 81.9    | $\frac{1}{4}$ |         |               |           |               |         |               |           |               | ..... | ..... |
| 4250            |         |               |           |               | - 100.8 | $\frac{1}{2}$ |           |               |         |               |           |               | ..... | ..... |
| 4260            | - 78.3  | $\frac{1}{2}$ | + 88.6    | $\frac{1}{4}$ | - 83.6  | $\frac{1}{2}$ |           |               | - 54.5  | $\frac{1}{2}$ | + 40.7    | $\frac{1}{4}$ | ..... | ..... |
| 4271            | - 80.5  | $\frac{1}{2}$ |           |               | - 90.2  | $\frac{1}{2}$ |           |               | - 36.8  | $\frac{1}{2}$ |           |               | ..... | ..... |
| 4289            | - 98.7  | $\frac{1}{2}$ | + 96.2    | $\frac{1}{4}$ | - 92.3  | $\frac{1}{2}$ | + 87.8    | $\frac{1}{4}$ | - 51.3  | $\frac{1}{2}$ | + 45.4    | $\frac{1}{4}$ | ..... | ..... |
| 4325            |         |               |           |               | - 88.0  | $\frac{1}{2}$ |           |               |         |               |           |               | ..... | ..... |
| 4310            |         |               |           |               | - 88.0  | $\frac{1}{2}$ | + 73.1    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4351            |         |               | + 92.5    | $\frac{1}{4}$ | - 76.6  | $\frac{1}{2}$ | + 60.6    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4395            |         |               |           |               |         |               | + 79.5    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4481            | - 70.3  | $\frac{1}{2}$ | + 103.7   | $\frac{1}{4}$ | - 97.4  | $\frac{1}{2}$ | + 101.3   | $\frac{1}{4}$ | - 59.1  | $\frac{1}{2}$ | + 15.1    | $\frac{1}{4}$ | ..... | ..... |
| 4501            | - 81.4  | $\frac{1}{2}$ | + 76.7    |               |         |               |           |               |         |               |           |               | ..... | ..... |
| 4549            | - 86.3  | $\frac{1}{2}$ | + 87.5    | $\frac{1}{4}$ | - 75.8  | $\frac{1}{2}$ | + 96.8    | $\frac{1}{4}$ |         |               |           |               | ..... | ..... |
| 4572            | - 77.6  | $\frac{1}{2}$ |           |               |         |               |           |               |         |               |           |               | ..... | ..... |
| Weighted mean   | - 83.61 |               | + 87.30   |               | - 85.61 |               | + 88.93   |               | - 52.48 |               | + 31.52   |               | ..... | ..... |
| V <sub>a</sub>  | + 28.13 |               | + 28.13   |               | + 28.20 |               | + 28.20   |               | + 27.18 |               | + 27.18   |               | ..... | ..... |
| V <sub>d</sub>  | + 0.20  |               | + 0.20    |               | + 0.13  |               | + 0.13    |               | + 0.21  |               | + 0.21    |               | ..... | ..... |
| Curv.           | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               | ..... | ..... |
| Radial Velocity | - 55.6  |               | + 115.4   |               | - 57.6  |               | + 117.0   |               | - 25.4  |               | + 58.6    |               | ..... | ..... |

MEASURES OF 40 AURIGÆ - *Continued*

| λ                  | 7924    |               |           |               | 8074    |               |           |               | 8081    |               |           |               |      |     |
|--------------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|---------|---------------|-----------|---------------|------|-----|
|                    | Primary |               | Secondary |               | Primary |               | Secondary |               | Primary |               | Secondary |               |      |     |
|                    | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel.    | Wt.           | Vel.      | Wt.           | Vel. | Wt. |
| 1005               | -73.0   | $\frac{1}{2}$ |           |               | -22.2   | $\frac{1}{2}$ | +113.2    | $\frac{1}{4}$ | -11.1   | $\frac{1}{2}$ | +113.2    | $\frac{1}{4}$ |      |     |
| 4030               | -61.4   | $\frac{1}{2}$ |           |               | -26.2   | $\frac{1}{2}$ | .....     |               |         |               |           |               |      |     |
| 1033               |         |               | +121.6    | $\frac{1}{4}$ | -29.1   | $\frac{1}{2}$ | .....     |               |         |               |           |               |      |     |
| 4045               | -71.8   | $\frac{1}{2}$ | +126.8    | $\frac{1}{4}$ | -27.5   | $\frac{1}{2}$ | +116.2    | $\frac{1}{4}$ | -16.8   | $\frac{1}{2}$ | +125.5    | $\frac{1}{4}$ |      |     |
| 1063               | -73.9   | $\frac{1}{2}$ |           |               | -21.7   | $\frac{1}{2}$ | +105.5    | $\frac{1}{4}$ |         |               |           |               |      |     |
| 4071               |         |               |           |               | -13.6   | $\frac{1}{2}$ | +118.5    | $\frac{1}{4}$ | - 8.6   | $\frac{1}{2}$ | +129.5    | $\frac{1}{4}$ |      |     |
| 4077               | -73.0   | $\frac{1}{2}$ |           |               | -23.7   | $\frac{1}{2}$ | +115.5    | $\frac{1}{4}$ | 1.6     | $\frac{1}{2}$ | +112.2    | $\frac{1}{4}$ |      |     |
| 4113               | -66.7   | $\frac{1}{2}$ | +105.9    | $\frac{1}{4}$ | -17.9   | $\frac{1}{2}$ | +127.6    | $\frac{1}{4}$ |         |               |           |               |      |     |
| 4198               | -75.8   | $\frac{1}{2}$ |           |               | -12.1   | $\frac{1}{2}$ |           |               |         |               |           |               |      |     |
| 4215               | -62.0   | $\frac{1}{2}$ |           |               | -31.8   | $\frac{1}{2}$ | +120.5    | $\frac{1}{4}$ |         |               |           |               |      |     |
| 4233               | -65.4   | $\frac{1}{2}$ |           |               | -13.5   | $\frac{1}{2}$ |           |               | -18.0   | $\frac{1}{2}$ | +115.5    | $\frac{1}{4}$ |      |     |
| 4236               | -66.8   | $\frac{1}{2}$ | +114.7    | $\frac{1}{2}$ |         |               |           |               |         |               |           |               |      |     |
| 4250               | -82.2   | $\frac{1}{2}$ |           |               |         |               |           |               | -20.6   | $\frac{1}{2}$ | + 92.4    | $\frac{1}{4}$ |      |     |
| 4260               |         |               |           |               | -23.9   | $\frac{1}{2}$ | +119.0    | $\frac{1}{4}$ | -25.5   | $\frac{1}{2}$ | + 96.8    | $\frac{1}{4}$ |      |     |
| 4271               |         |               |           |               | -27.9   | $\frac{1}{2}$ | +116.0    | $\frac{1}{4}$ | -22.5   | $\frac{1}{2}$ | +105.6    | $\frac{1}{4}$ |      |     |
| 4289               | -73.9   | $\frac{1}{2}$ | + 94.0    | $\frac{1}{4}$ | -31.6   | $\frac{1}{2}$ |           |               | -19.0   | $\frac{1}{2}$ |           |               |      |     |
| 4308               | -89.5   | $\frac{1}{2}$ |           |               |         |               |           |               |         |               | +108.1    | $\frac{1}{4}$ |      |     |
| 4325               | -65.9   | $\frac{1}{2}$ | +101.5    | $\frac{1}{4}$ |         |               |           |               | - 2.8   | $\frac{1}{2}$ | +106.6    | $\frac{1}{4}$ |      |     |
| 4351               | -71.8   | $\frac{1}{2}$ | +105.3    | $\frac{1}{4}$ |         |               |           |               | - 9.1   | $\frac{1}{2}$ | +129.1    | $\frac{1}{4}$ |      |     |
| 4181               | -75.1   | $\frac{1}{2}$ | +121.0    | $\frac{1}{4}$ |         |               |           |               | -13.8   | $\frac{1}{2}$ |           |               |      |     |
| 4519               | -70.9   | $\frac{1}{2}$ | +123.4    | $\frac{1}{4}$ | -32.8   | $\frac{1}{2}$ | +130.5    | $\frac{1}{4}$ | -15.7   | $\frac{1}{2}$ |           |               |      |     |
| Weighted<br>mean   | - 71.71 |               | +113.35   |               | - 23.72 |               | +118.25   |               | - 14.70 |               | +112.25   |               |      |     |
| $V_s$              | + 8.01  |               | + 8.01    |               | - 26.88 |               | - 26.88   |               | - 27.22 |               | - 27.22   |               |      |     |
| $V_d$              | + 0.12  |               | + 0.12    |               | - 0.06  |               | - 0.06    |               | + 0.04  |               | + 0.04    |               |      |     |
| Curv.              | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               | - 0.28  |               | - 0.28    |               |      |     |
| Radial<br>Velocity | - 63.8  |               | +121.2    |               | - 50.9  |               | + 91.0    |               | - 42.0  |               | + 84.8    |               |      |     |



In the majority of the early plates the lines are single, for the shape of the velocity curve is such that plates taken at random stand about one chance in seven of showing the two components far enough apart to be resolved on one-prism spectrograms. The character of the velocity curve was suspected from the first few plates and as soon as the period was approximately determined, a few exposures were made with the slit of the spectrograph narrower than usual in an attempt to see whether the two components could be resolved in the interval, phases twelve to thirty days (cf. curve). This attempt was unsuccessful and so the observations thereafter were confined in general to the narrow limits, phases from two to eleven days.

The problem of determining satisfactory elements presents some difficulties. Ordinarily when two sets of lines are visible on the spectrograms, it is possible to make use of the plates taken near the crossing points of the two curves. Plates were taken at these points and were useful in finding the preliminary elements, but they were not included in the final solution because the shape of the radial velocity curves before and after crossing are very dissimilar. The result is that the final elements rest upon measures of plates where only the two spectra are visible. There can be no doubt that much more determinate elements would result with higher dispersion, but the final elements given are believed to be fairly accurate. This belief is founded not only on the small probable errors, which the least-square solution assigns to the results, but also on the disposition of the velocities where the spectrograms show single lines.

The observations where both components were visible were first grouped into normal places.

## NORMAL PLACES

|    | Julian Date   | Phase<br>from J. D.<br>2,420,462 | Primary  |        |                      |                      | Secondary |        |                      |                      |
|----|---------------|----------------------------------|----------|--------|----------------------|----------------------|-----------|--------|----------------------|----------------------|
|    |               |                                  | Velocity | Weight | (O - C) <sub>1</sub> | (O - C) <sub>2</sub> | Velocity  | Weight | (O - C) <sub>1</sub> | (O - C) <sub>2</sub> |
| 1  | 2,420,466.245 | 4.245                            | -16.60   | .8     | +2.52                | +4.76                | +66.4     | .4     | +1.48                | +6.26                |
| 2  | 466.696       | 4.696                            | -29.40   | 1.0    | +1.43                | +0.71                | +72.5     | .5     | -3.03                | -1.28                |
| 3  | 167.211       | 5.211                            | -15.60   | .8     | -0.40                | -1.01                | +91.5     | .4     | -1.92                | -0.22                |
| 4  | 167.404       | 5.404                            | -52.30   | 1.2    | -1.86                | -2.46                | +91.4     | .6     | -5.72                | -4.01                |
| 5  | 167.622       | 5.622                            | -53.20   | 1.2    | +2.63                | +2.13                | +103.1    | .6     | -2.99                | -1.45                |
| 6  | 168.041       | 6.041                            | -65.20   | .6     | -3.12                | -3.35                | +114.0    | .3     | -0.01                | +1.13                |
| 7  | 468.466       | 6.466                            | -65.20   | .8     | -2.33                | -2.27                | +114.0    | .4     | -0.98                | -0.06                |
| 8  | 468.418       | 6.418                            | -59.00   | 1.2    | +2.82                | +3.28                | +117.9    | .6     | +1.21                | +1.62                |
| 9  | 469.243       | 7.243                            | -12.00   | 1.2    | +2.42                | +1.42                | +92.4     | .6     | -0.37                | -1.51                |
| 10 | 469.481       | 7.481                            | -12.40   | 1.6    | -5.41                | -3.48                | +84.9     | .8     | +1.90                | +0.40                |
| 11 | 469.742       | 7.742                            | -30.40   | 0.8    | -0.90                | +1.22                | +75.2     | .4     | +0.92                | -0.77                |
| 12 | 470.094       | 8.094                            | -23.60   | 1.0    | -3.05                | +0.85                | +61.5     | .5     | +1.11                | -0.68                |

The relation

$$\gamma(m_1 + m_2) = m_2 V_1 + m_1 V_2$$

was transformed by putting  $k = m_1 / m_2$  and  $y = \gamma(1+k)$  so that it becomes

$$y = V_1 + k V_2$$

The twelve normal places for  $V_1$  and  $V_2$  give twelve observation equations to determine  $y$  and  $k$ . This solution was made and gave

$$k = 0.828 \quad y = +31.56$$

or  $\gamma = +17.2$  kilometres.

The normal places and the individual observations, where the two components were not separated, were now plotted on cross-section paper as in the radial velocity curve. The value of  $\omega$  was assumed to be  $180^\circ$  for the primary curve, (*i.e.*) the one showing the smaller amplitude. The determination of  $e$  was made by trial. It is an easy matter with King's graphical method to try any given set of elements and as  $\omega$  is already assumed known, the only remaining elements that need to be varied are  $K$  and  $e$ .

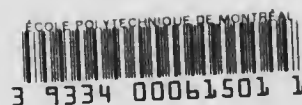
The following elements were selected.

$$\begin{aligned} P &= 28.28 \text{ days} \\ T &= \text{J. D. } 2,420,468.20 \\ e &= 0.56 \\ \omega_1 &= 180^\circ \\ \gamma &= +17.2 \text{ km.} \\ C_1 &= -11.49 \text{ km.} \\ C_2 &= +52.31 \text{ km.} \\ K_1 &= 51.41 \text{ km.} \\ K_2 &= 62.70 \text{ km.} \end{aligned}$$

The residuals which result from these elements are given under the heading  $(O-C)_1$  in the table of normal places. In making a least-square solution, all the elements save  $P$  were included and the elements of both curves carried at the same time, so that the twelve normal places yield twenty-four observation equations. The results of the fainter component were given half the weight assigned to the primary.

## OBSERVATION EQUATIONS

|    | $x$ | $y$    | $z$    | $u$    | $v$    | $w$    | $-u$   | Weight |
|----|-----|--------|--------|--------|--------|--------|--------|--------|
| 1  | 1   | - .708 | 0      | +1.015 | - .508 | + .596 | -2.520 | .8     |
| 2  | 1   | - .930 | 0      | + .912 | - .177 | + .695 | -1.431 | 1.0    |
| 3  | 1   | -1.216 | 0      | + .196 | - .388 | + .725 | + .100 | .8     |
| 4  | 1   | -1.318 | 0      | + .260 | - .336 | + .680 | +1.860 | 1.2    |
| 5  | 1   | -1.422 | 0      | + .038 | - .260 | + .572 | -2.630 | 1.2    |
| 6  | 1   | -1.511 | 0      | + .452 | - .091 | + .219 | +3.120 | .6     |
| 7  | 1   | -1.560 | 0      | + .512 | - .016 | + .010 | +2.330 | .8     |
| 8  | 1   | -1.539 | 0      | + .431 | + .105 | - .251 | -2.820 | 1.2    |
| 9  | 1   | -1.200 | 0      | + .529 | + .395 | - .729 | -2.420 | 1.2    |
| 10 | 1   | -1.050 | 0      | + .780 | + .118 | - .727 | +5.410 | 1.6    |
| 11 | ..  | - .910 | 0      | + .928 | + .182 | - .689 | +0.900 | 0.8    |
| 12 | ..  | - .736 | 0      | +1.009 | + .506 | - .611 | +3.050 | 1.0    |
| 13 | ..  | 0      | + .708 | -1.238 | + .620 | - .727 | -1.180 | .4     |
| 14 | ..  | 0      | + .930 | -1.112 | + .582 | - .848 | +3.030 | .5     |
| 15 | ..  | 0      | +1.216 | - .905 | + .473 | - .885 | +1.920 | .4     |
| 16 | ..  | 0      | +1.318 | - .317 | + .409 | - .830 | +5.720 | .6     |
| 17 | ..  | 0      | +1.422 | + .016 | + .317 | - .698 | +2.990 | .6     |
| 18 | ..  | 0      | +1.544 | + .552 | + .111 | - .268 | +0.010 | .3     |
| 19 | ..  | 0      | +1.560 | + .625 | + .020 | - .019 | +0.980 | .4     |
| 20 | ..  | 0      | +1.539 | + .529 | - .127 | + .306 | -4.210 | .6     |
| 21 | ..  | 0      | +1.200 | - .615 | - .481 | + .889 | +0.370 | .6     |
| 22 | ..  | 0      | +1.050 | - .951 | - .517 | + .887 | -1.900 | .8     |
| 23 | ..  | 0      | +0.910 | -1.132 | - .587 | + .810 | -0.920 | .4     |
| 24 | ..  | 0      | + .736 | -1.231 | - .617 | + .716 | -1.110 | .5     |



$$\begin{aligned} \text{Where } x &= d\gamma \\ y &= dK_1 \\ z &= dK_2 \\ u &= de \\ v &= 100d\omega \\ w &= \frac{100\mu dT}{(1-e^2)^{\frac{3}{2}}} \end{aligned}$$

The normal equations are

$$\begin{aligned} 18.300x - 14.362y + 7.180z + 1.881u + 0.091v - 0.034w + 7.222 &= 0 \\ + 17.876y - 0.000z - 3.882u - 0.049v - 0.306w - 5.231 &= 0 \\ + 8.933z - 2.367u - 0.030v - 0.189w + 2.798 &= 0 \\ + 9.607u + 0.978v - 1.485w + 6.571 &= 0 \\ + 3.031v - 4.774w + 9.460 &= 0 \\ + 7.809w - 14.932 &= 0 \end{aligned}$$

$$\begin{aligned} \text{Whence } x &= -0.293 & \text{or } d\gamma &= -0.29 \text{ km.} \\ y &= -0.030 & dK_1 &= -0.03 \text{ km.} \\ z &= -0.186 & dK_2 &= -0.19 \text{ km.} \\ u &= -0.380 & de &= -0.0038 \\ v &= -2.808 & d\omega &= -1^\circ.60 \\ w &= +0.116 & dT &= +.003 \text{ day} \end{aligned}$$

and the final elements with their probable errors become,

$$\begin{aligned} P &= 28.28 \text{ days} & \pm 0.05 \text{ (estimated)} \\ T &= \text{J.D. } 2,420,468.197 & \pm 0.088 \text{ day} \\ e &= 0.556 & \pm 0.0065 \\ \omega_1 &= 178^\circ.41 & \pm 3^\circ.1 \\ \omega_2 &= 1^\circ.60 & \pm 3^\circ.1 \\ K_1 &= 51.38 \text{ km.} & \pm 1.50 \text{ km.} \\ K_2 &= 62.51 \text{ km.} & \pm 1.64 \text{ km.} \\ \gamma &= +16.91 \text{ km.} & \pm 1.83 \text{ km.} \\ a_1 \sin i &= 16,550,000 \text{ km.} \\ a_2 \sin i &= 20,140,000 \text{ km.} \\ m_1 \sin^3 i &= 1.354 \odot \\ m_2 \sin^3 i &= 1.113 \odot \end{aligned}$$

Dominion Observatory

Ottawa

May, 1917.

